(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

I D S

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
27 December 2001 (27.12.2001)

PCT

(10) International Publication Number
WO 01/97659 A1

(51) International Patent Classification[7]: A47F 3/00, 5/00 // E05F 5/00

(21) International Application Number: PCT/SE01/01375

(22) International Filing Date: 18 June 2001 (18.06.2001)

(25) Filing Language: Swedish

(26) Publication Language: English

(30) Priority Data:
0002288-9 19 June 2000 (19.06.2000) SE

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(81) Designated States *(national)*: AE, AG, AL, AM, AT, AT (utility model), AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, CZ (utility model), DE, DE (utility model), DK, DK (utility model), DM, DZ, EC, EE, EE (utility model), ES, FI, FI (utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

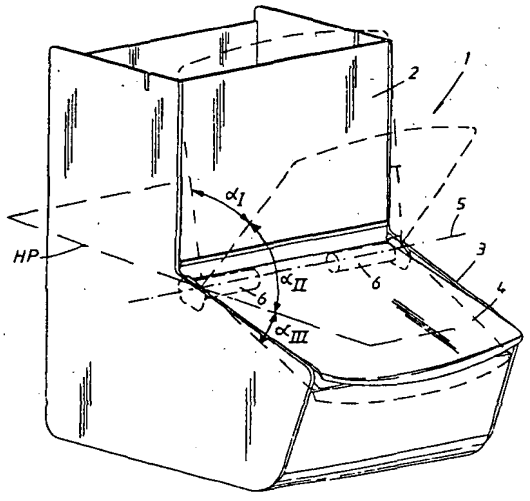
(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:
— *of inventorship (Rule 4.17(iv)) for US only*

Published:
— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: A LID CLOSING ARRANGEMENT



(57) Abstract: A closing arrangement for and method of closing a lid (4, 44) that is normally in closed position, which lid (4, 44) is pivotable about a substantially horizontal axis (5), the arrangement comprising a spring device (16, 56) acting between the lid (4, 44) and a container (1) on which the lid (4, 44) is fitted, which spring device (16, 56) is arranged to be tensioned when the lid (4, 44) is opened and to commence closing the lid (4, 44) from an open position at least as far as a position in which the lid continues the closing action on its own due to the force of gravity, a damper (8, 57) being arranged to dampen the movement of the lid (4, 44) at least during a part of the lid's (4, 44) movement from open position to closed position.

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A LID CLOSING ARRANGEMENT

Technical field

The present invention relates to an automatic lid-closing arrangement, preferably for use on containers, boxes, bins or shelves for foods, e.g. a self-service container for sweets.

Background art

Containers and display cases, often wholly or partially transparent, for refrigerated or frozen foods and designed for self-service of sweets in kiosks and stores, are often provided with transparent flap-down lids that can be placed in a permanently open position. In such an open position the food is exposed to the surroundings to a greater extent than if the lid had been closed. From the point of view of hygiene or temperature, therefore, it is desirable for these lids to be kept closed when no goods are being taken from the containers.

Automatically closing lids are already known in the form of double-walled constructions in which a liquid flows between various spaces to alter the centre of gravity of the lid, thereby achieving automatic closing. Such a construction is extremely expensive if the installation is to be carried out on a large number of containers spread nationally and/or internationally. The liquid-filled lid also impairs transparency and thus display of the food. Liquid in the lid is also perceived as unhygienic since leakage may occur.

SE 510 429 also shows an arrangement for automatic closing of a pivotable lid. When opened this lid compresses an elastically deformable air bubble secured in the front wall of the container in the vicinity of the opened lid, the air bubble tending to expand to the starting position and thus press the lid back over its unstable position of equilibrium, after which the lid closes with a bang. A drawback with such a closing arrangement is that the front wall of the container is provided with this arrangement instead of displaying the food inside as much as possible. Furthermore, the bangs when the arrangement closes will be extremely irritating for both customers and store assistants, especially if the number of containers in a particular area may be up to about 200. Each customer who opens the lid must also deform the arrangement if it is to function as intended, which the customers perceive as irritating.

Object of the invention

The object of the present invention is to solve the above problems and provide a lid-closing arrangement that enables automatic closing of an upwardly openable lid of a container, primarily for food, but which is also applicable to other types of containers such as pharmaceuticals, health products and the like, to protect the contents in the container from the surrounding atmosphere by keeping the lid closed.

A second object of the present invention is, in a more hygienic manner than previously, to provide automatic closing of the lid of such a container.

Another object is to enable closing of a lid divided into an initiation phase during which the lid is influenced by a closing force, and a closing phase during which the lid is closed by its own dead weight and the force changes into a retarding effect.

The object of the present invention is furthermore to provide an inexpensive solution to the above-mentioned problems, which solution also results in improved closing properties of the lid for a container.

The object is also to greatly reduce the sound level when the lid is closed.

Brief description of the invention

The present invention, as defined in the independent claims 1 and 10, fulfils the objects listed above, thereby eliminating the drawbacks mentioned. Suitable embodiments of the invention are defined in the dependent claims.

The lid in accordance with the invention is provided with a closing arrangement comprising spring device and damper. These parts may be constructed as separate units or may consist of only one unit in which both spring function and damper function have been combined. The spring device is arranged to initiate a closing movement of the lid from open position and the damper is arranged to dampen the lid's movement, either continuously or at least during a part of the movement, in both directions or only during closing or opening. The spring device also has a retarding effect on the movement of the lid immediately prior to closing, in order to avoid disturbing noise. The spring force is zero upon opening the lid at an angle of 20°-40° upwards from the horizontal plane. When the lid is opened further the spring is tensioned and, when the lid is released, instantaneously initiates closing. If the angle of opening is less than 20°-40° the spring is tensioned in

the other direction to retard and balance the weight of the lid so that it closes gently. Throughout the movement of the lid the damper, which is preferably of silicon grease type, acts as a member for balancing and controlling the speed of movement. The damper is chosen to function within a temperature interval of 18°-25°C for goods at room temperature and within a temperature interval of -8° to 0°C for counters for refrigerated and frozen foods.

The number of springs is one or more with different spring characteristics for each damper. The dampers preferably consist of standard components, e.g. Silicon Damper from ITW Produx, the spring(s) being selected and connected to the damper depending on the weight of the lid.

Applications of the present invention include lid-closing arrangements in the food branch, particularly for containers for sweets or other self-service products, like those illustrated in the embodiments described in the following. Separate phases for closing lids for different application purposes can be determined with great accuracy as regards time by means of the choice of composite parts in accordance with the present invention.

In the embodiments illustrated below the balancing device to achieve gentle closing of the lid is provided by the torsion springs being tensioned in opposite directions, but may also be in the form of leaf springs, counterweights or some other means.

Brief description of the drawings

The invention will now be described in more detail with reference to the accompanying drawings.

Figure 1 shows a view in perspective of a first embodiment of the present invention.

Figure 2 shows an exploded view of a lid with spring device and damper in accordance with the embodiment in fig. 1.

Figure 3 shows a section through the axis of rotation, in which both sides of the lid are provided with a spring device and a damper as shown in fig. 2.

Figure 4 shows a view in perspective of a second embodiment of the present invention.

Figure 5 shows an exploded view of a lid with a closing arrangement as

shown in the embodiment in fig. 4.

Figure 6 shows an exploded view of a closing arrangement with damper and spring device as shown in the embodiment in fig. 5.

Description of the invention

Figure 1 shows a transparent container 1 for sweets, provided with a vertical refilling section 2 and a section 3 for self-service, extending outwardly from the refilling section. The self-service section 3 is limited upwardly, either completely or partially, by a flat transparent lid 4 that is pivotably journalled about a substantially horizontal axis 5 situated close to the refilling part 2. The refilling part 2 is also provided with a lid, not shown. As is clear from the drawing, the distance between the axis and the vertical refilling section 2 results in the lid, when flapped up all the way, assuming an angle such that the lid is held open by its own dead weight unless it is influenced by forces other than its dead weight. In the embodiment shown, the lid assumes when closed an angle inclined obliquely to the refilling section. The angle of movement α between fully open and fully closed position is 90-170°. The angle of movement α is divided into three parts, α_I, α_{II}, α_{III}, where α_I denotes an initiation phase extending from fully open (flapped up) position to a position where the dead weight of the lid takes over continue closing. α_{II} denotes a first closing phase extending from the position where the dead weight of the lid takes over, to an imagined horizontal plane HP through the axis 5 and α_{III} denotes the angle between the horizontal plane and a position in which the lid is fully closed. All these positions are indicated in broken lines in the figure. The angle α_{II} lies within the interval 20°-40°. A closing arrangement 6 is mounted on each side of the lid between the lid 4 and the self-service section 3. The closing arrangement is mounted in cavities in the rear edge of the lid, said cavities extending inwardly towards the centre of the lid along its axis 5.

Figure 2 shows a dismantled, non-transparent lid 4 provided with said cavities 7 for the closing arrangement 6 in the rear edge of the lid. At the bottom of the cavity is a groove in which the end of the co-operating end of the outer casing 9 of a damper 8 is arranged to be introduced to prevent the outer casing 9 turning in relation to the lid 4. The other end of the damper 8 is provided with a rotary body 10 that is inserted into the outer casing 9 and provided with driving surfaces, not shown, designed to convey silicon grease within the damper when the

rotary body 10 is turned in relation to the outer casing 9. The end of the rotary body 10 is also provided with a quadratic hole 11 in which a co-operating quadratic peg 12 is inserted. The peg is fixed on a bearing plate 13 provided on its opposite side with an assembly a mounting stud 14 to fit a corresponding recess in the side wall of the container at assembly. The bearing plate is also mounted on the container and prevented from rotating by an edge 15 co-operating with the container.

A spring device 16 in the form of a cylindrical torsion spring is also mounted around the outer casing of the damper at its outer end, one end of the spring device 16 being clamped in the bearing plate 13 while its other end is clamped in the lid 4 or in the cavity 7 of the lid.

The spring device 16 is so clamped between the lid and the container that it is unloaded at an opening angle of 20°-40° upwards from the horizontal plane HP when the lid is fitted.

Figure 3 shows the lid and its closing arrangement in a section through the axis 5, the dampers 8 being mounted in the two cavities 7 in the lid 4. The dampers 8 are here clamped against rotation between the lid 4 and the bearing plates 13. The figure also shows how the spring device 16 is placed when the lid is fitted. The figure also shows how the bearing plates 13 are prevented by the edge 15 from turning in relation to the container 1.

Figure 4 shows a second embodiment of the invention in which a closing arrangement 46 is arranged to act between the lid 44 and the container 1. The closing arrangement 46 comprises a sleeve 47 fitted into a recess 48 in the lid 44.

Figure 5 reveals that the sleeve is provided with a groove 49 to prevent the sleeve 47 turning in relation to the lid 44. The closing arrangement 46 also comprises an effecting body 50 which is either pressed or glued into the sleeve 47.

Figure 6 shows the effecting body 50 in fig. 5 in dismantled state to reveal a spring device 56 and two damper halves 57a, 57b in a damper 57. This embodiment of the closing arrangement also shows the surfaces 58 mentioned above, which form a part of the damper 57. A pivot means 59 provided with a pivot 60 on one side and a driving means 61 on the other. The driving means 61 engages in one half 57a of the damper, which is turned together with the pivot means 59 so that a relative movement is produced between the two halves of the

damper. An end piece 62 provided with locking catches 63 is arranged to be snapped into place on a damper housing 65 provided with protrusions 64. The spring member 56 in the form of a cylindrical torsion spring is fitted around the damper halves 57a, 57b. One end of the spring is secured in the pivot means 59 and its other end is secured in the damper housing 65. The spring is thus tensioned depending on the rotation of the pivot 60, which in turn is dependent on the position of the lid in the embodiment shown in fig. 1.

The function of the lid-closing arrangement in accordance with the embodiments shown in conjunction with its use in a sweets dispenser is a follows:

Normally the lid is closed, i.e. in its flapped-down position. When a customer wishes to take sweets from the self-service section 3 of the container 1, he/she opens the lid 4 to a fully open position, i.e. the lid is flapped up until it encounters the refilling section 2 of the container, i.e. the position shown in broken lines in fig. 1. When the customer releases the lid the spring device 6 influences the lid to resume its normal position, i.e. the spring device slowly turns the lid back past an upper dead position during the initiation phase α_I which is determined as regards time to a suitable value in the interval 2-30 sec, e.g. 20 sec, so that the customer has time to take out the desired amount of sweets. The lid then continues its movement more quickly, due to force of gravity, down to its normal position during the closing phase α_{II}, dampened by the damper 8, 57. The time required for this closing phase is considerably shorter than during the initiation phase. A suitable duration for the closing phase is about 2 seconds. Particularly immediately prior to the closing of the lid 4 the damper operates in combination with the spring device which is tensioned in the opposite direction in order to avoid disturbing noise when the lid is closed.

Within the scope of the invention it is also possible to vary the spring devices, both as to type and placing. A cylindrical draw spring, for instance, may be mounted at a tangent to the periphery of the damper. The dampers can also be chosen or adjusted to the type of lid in current use.

CLAIMS

1. A closing arrangement for a lid (4, 44) that is normally in closed position, which lid (4, 44) is pivotable about a substantially horizontal axis (5), the arrangement comprising a spring device (16, 56) acting between the lid (4, 44) and a container (1) on which the lid (4, 44) is fitted, which spring device (16, 56) is arranged to be tensioned when the lid (4, 44) is opened and to commence closing the lid (4, 44) from an open position at least as far as a position in which the lid continues the closing action on its own due to the force of gravity, **characterized** in that the arrangement also comprises a damper (8, 57) arranged to dampen the movement of the lid (4, 44) during a part of the lid's (4, 44) movement from open position to closed position.

2. An arrangement as claimed in claim 1, **characterized** in that a balancing device is also arranged to be activated before the lid (4, 44) is closed in order to obtain a retarding force when the lid (4, 44) is closed.

3. An arrangement as claimed in claim 2, **characterized** in that the balancing device consists of the spring device (16, 56) which is arranged to be tensioned in the opposite direction to the dead weight of the lid (4, 44) when it is closed.

4. An arrangement as claimed in any one of claims 1-3, **characterized** in that the spring device (16, 56) is clamped in unloaded state between the lid (4, 44) and the container (1) at an angle of the lid (4, 44) within the interval 20°-40° upwards from a horizontal plane (HP) through the axis (5).

5. An arrangement as claimed in any one of claims 1-4, **characterized** in that the spring device (16, 56) and the damper (8, 57) are mounted on or in direct connection with the axis (5).

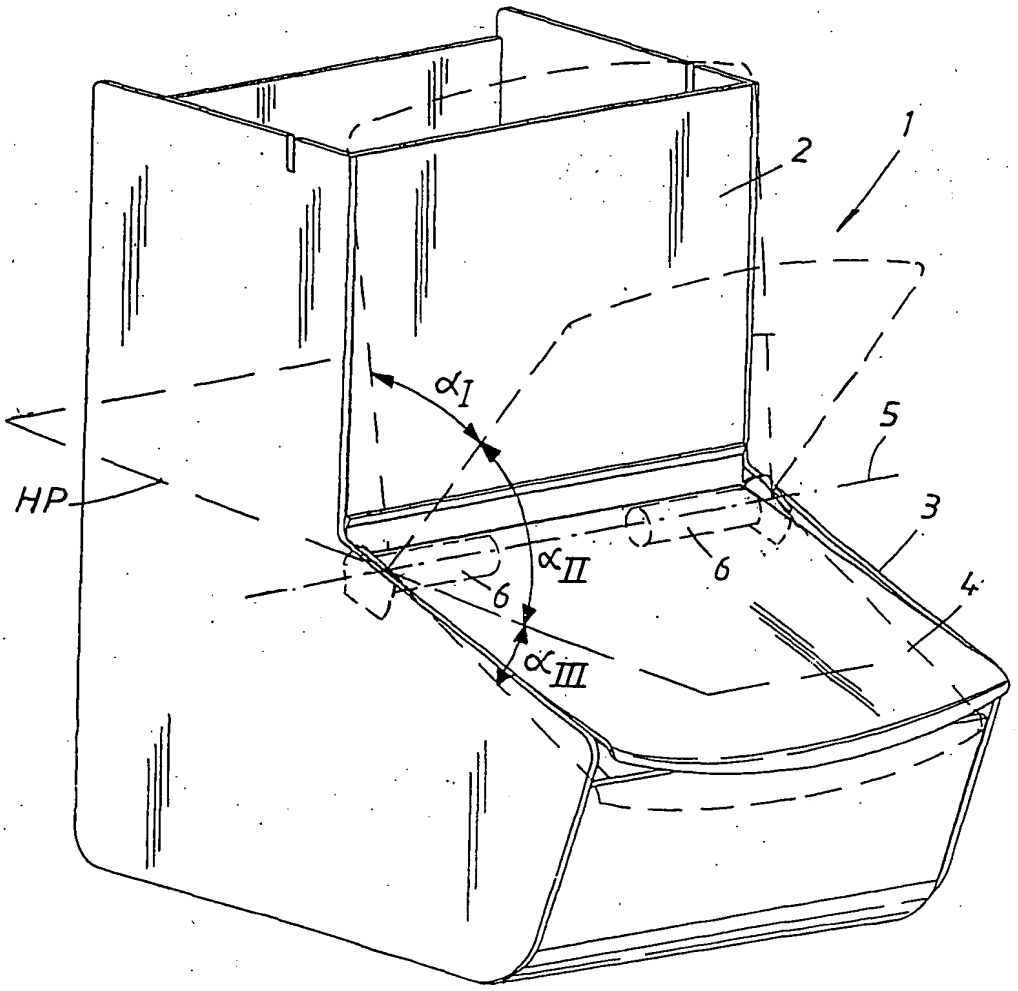
6. An arrangement as claimed in claim 5, **characterized** in that the spring device (16, 56) is mounted on one side of the axis (5) and the damper (8, 57) is mounted on the other side of the axis (5).

7. An arrangement as claimed in claim 5, **characterized** in that the spring device (16, 56) consists of a cylindrical helical spring mounted around the damper (8, 57) which consists of a cylindrical torsion damper, the spring device (16, 56) and the damper (8, 57) being mounted at the same end of the axis (5).

8. An arrangement as claimed in any one of claims 1-7, **characterized** in that the time from when the spring device (16, 56) commences closing the led (4, 44) from fully open position to a position when the force of gravity takes over continued closing is 2-30 s.

9. An arrangement as claimed in any one of claims 1-8, **characterized** in that the spring device (16, 56) is arranged to instantaneously commence closing the lid (4, 44) when it is released from its open position

Fig. 1



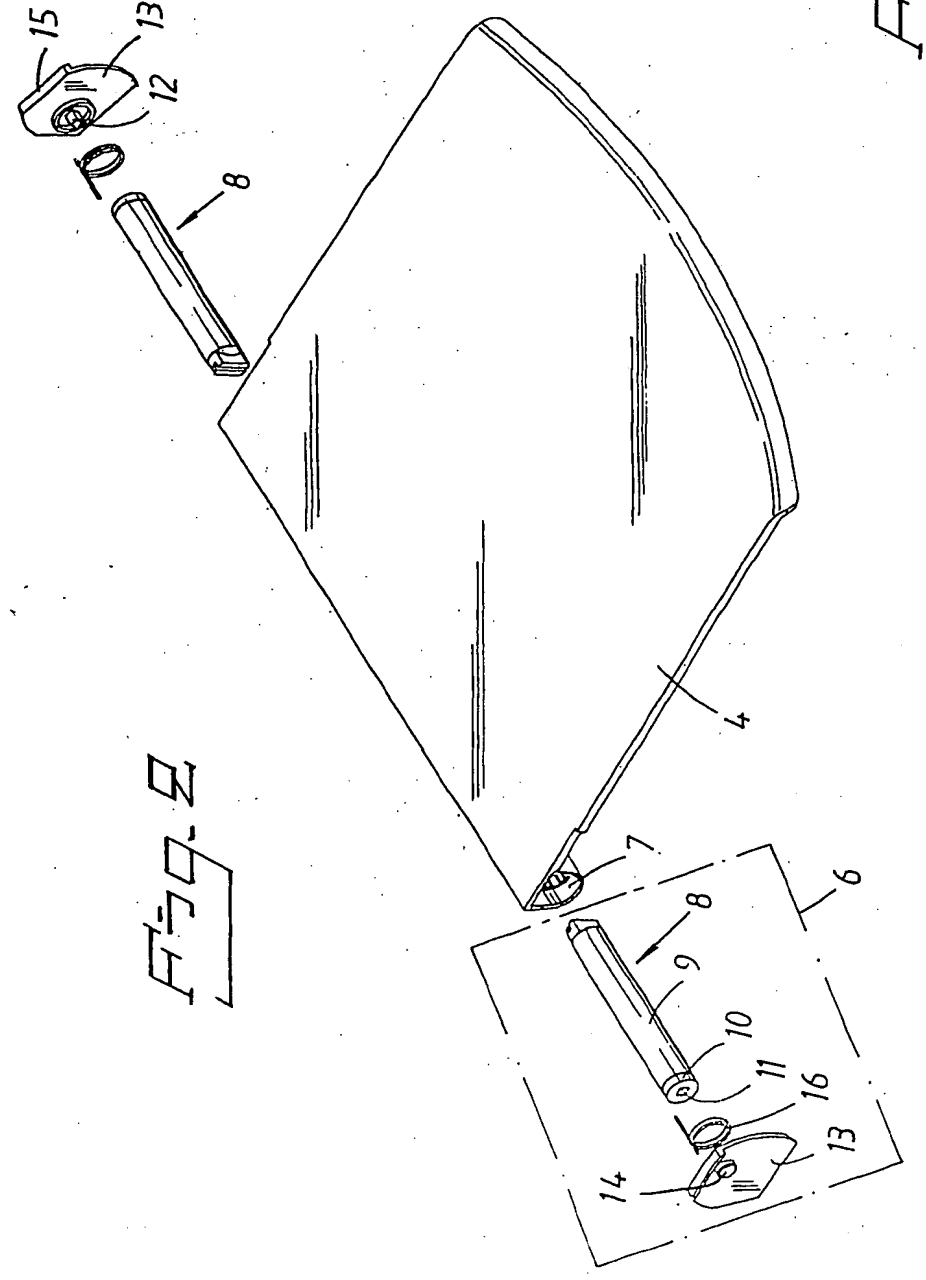


Fig. 2

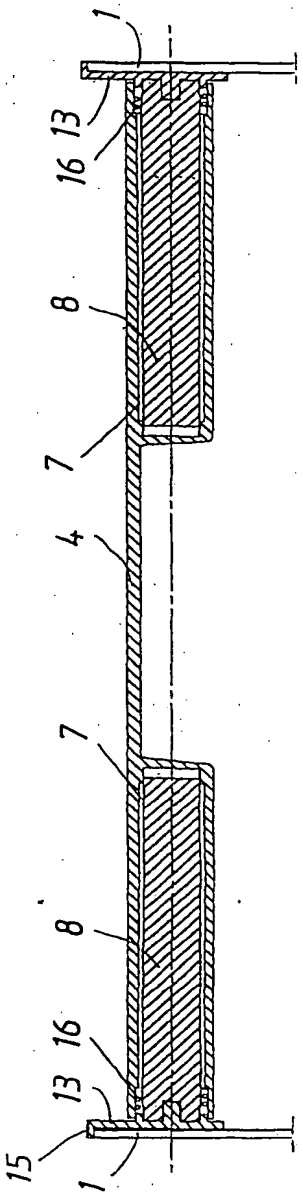


Fig. 3

Fig. 4

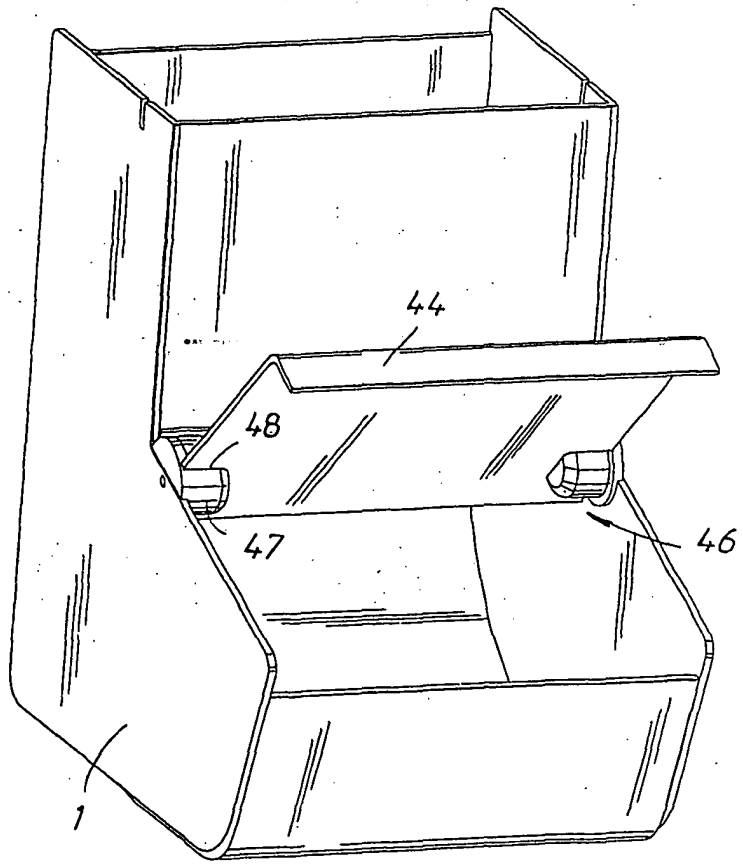
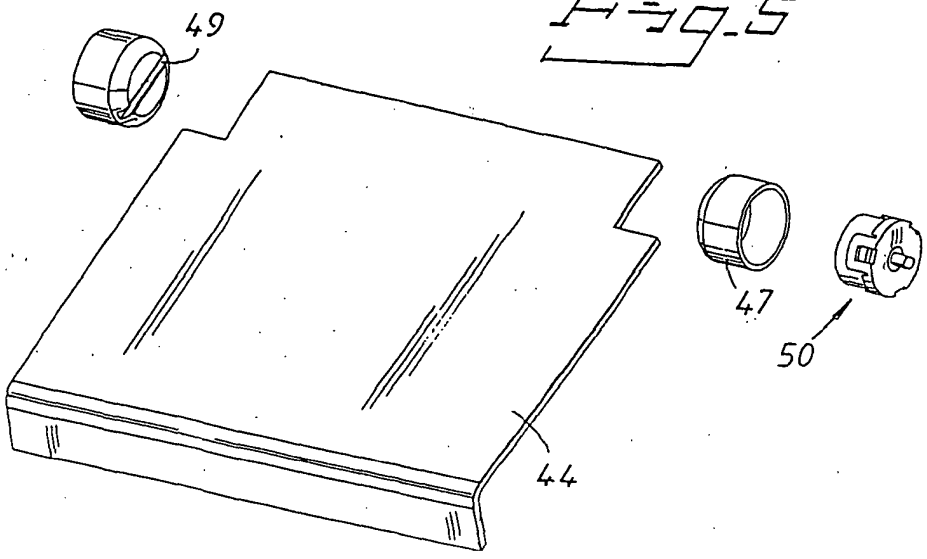


Fig. 5



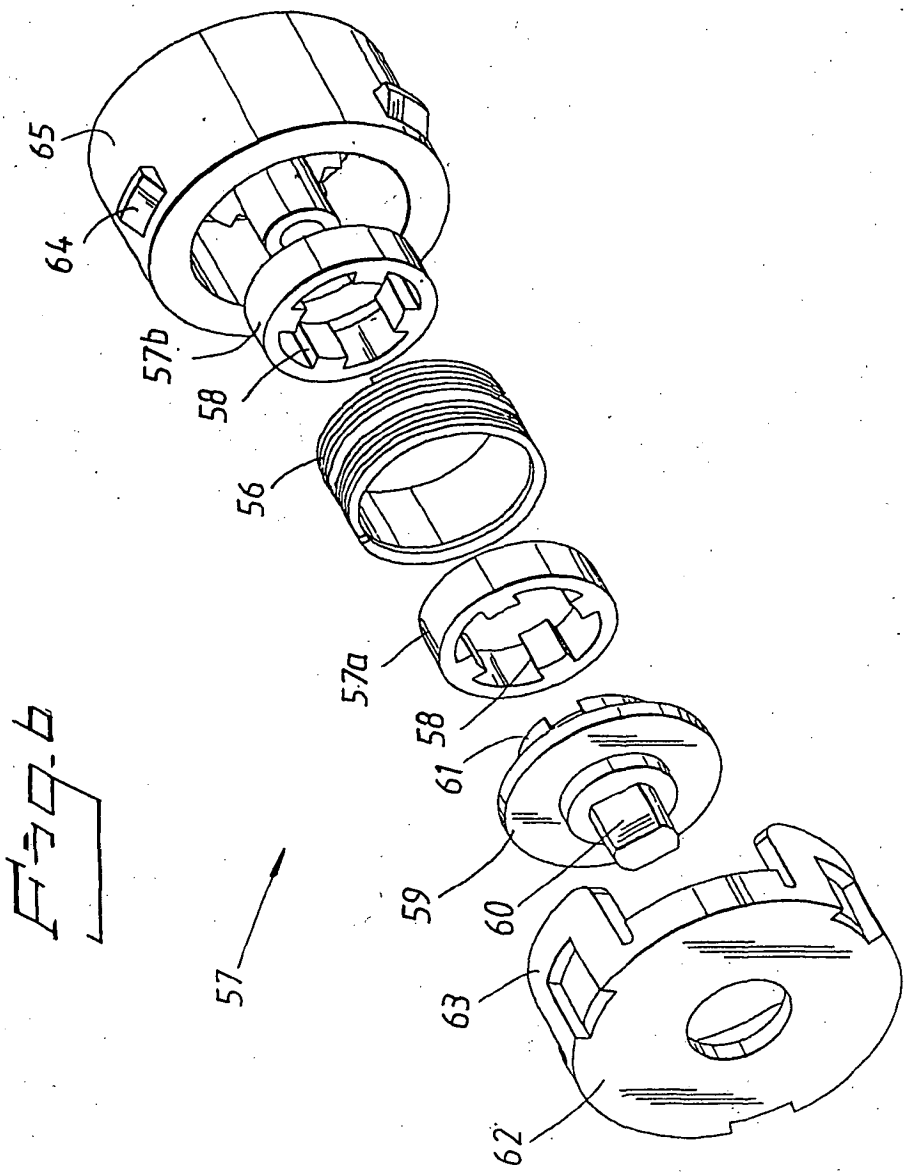


Fig. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 01/01375

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: A47F 3/00, A47F 5/00 // E05F 5/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: A47F, E05F, B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5361927 A (M. FREI), 8 November 1994 (08.11.94), column 3, line 8 - column 4, line 36, figures 1-3 --	1-9
A	US 4874210 A (F.A. CARROLL), 17 October 1989 (17.10.89), column 4, line 27 - line 41, figure 11 --	1-9
A	US 4550470 A (N. OMATA), 5 November 1985 (05.11.85), the whole document --	1-9
A	US 1622771 A (F. DAVIS), 29 March 1927 (29.03.27), page 2, line 5 - line 10 --	1-9

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:
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Date of the actual completion of the international search	Date of mailing of the international search report
24 Sept 2001	26-09-2001
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Inger Löfving / MRo Telephone No. +46 8 782 25 00

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 01/01375

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5546894 A (R. ST-PIERRE), 20 August 1996 (20.08.96), column 3, line 27 - line 45	1-9

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/SE 01/01375

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5361927 A	08/11/94	NONE	
US 4874210 A	17/10/89	AT 89139 T	15/05/93
		AU 601442 B	13/09/90
		AU 7504387 A	07/01/88
		BE 906097 A	16/04/87
		CA 1283082 A	16/04/91
		DE 3785793 A,T	17/06/93
		DK 165043 B,C	05/10/92
		DK 338087 A	03/01/88
		EP 0252681 A,B	13/01/88
		SE 0252681 T3	
		ES 2041685 T	01/12/93
		IE 57442 B,L	09/09/92
		NZ 220921 A	27/11/90
US 4550470 A	05/11/85	JP 1830564 C	15/03/94
		JP 5032606 B	17/05/93
		JP 59222631 A	14/12/84
US 1622771 A	29/03/27	NONE	
US 5546894 A	20/08/96	NONE	